

A NEW *WINTHEMIA* PARASITIC ON THE TOBACCO HORNWORM^{1,2}
(DIPTERA: TACHINIDAE)

CURTIS W. SABROSKY and C. J. DELOACH, JR., *Entomology Research Division,
Agricultural Research Service, U. S. Department of Agriculture*³

ABSTRACT—*Winthemia manducae*, n. sp., is described from North Carolina. A short key separates it from the related and similar species *datanae* and *sinuata*. Comparable variation in *datanae* is summarized.

The tachinid genus *Winthemia* Robineau-Desvoidy was revised by Reinhard (1931, Proc. U.S. Natl. Mus. 79(20):1-54), who recognized 32 species from the Americas, including 21 in North America north of Mexico. Only one Nearctic species, *W. citheroniae* Sabrosky, has been added since that time, but there are still undescribed species not easy to separate from those currently recognized. Among them is one reared by the junior author in his studies on parasites of the tobacco hornworm, *Manduca sexta* (Johannson), in North Carolina. It is the purpose of the present paper to describe this new species and to distinguish it from closely related and easily confused species, notably *W. datanae* (Townsend) and *W. sinuata* Reinhard, to which it will key in both sexes in Reinhard's revision.

Males of some species of *Winthemia* have so-called "sexual patches," which are well-defined, distinctly bounded, dense aggregations of hairs on the ventral aspect of tergum IV, or on both IV and V. In other species, such as the common *W. rufopicta* (Bigot), the hairs appear widely and rather equally spaced. A few species, including the new one herein described, are intermediate, with the hairs on IV and sometimes V more closely spaced and forming dark patches that lack clearly defined boundaries, the "patches" merging into the surrounding well-spaced hairs. Reinhard placed these species in his key as not having defined patches.

The key by Reinhard (1931) is still so serviceable that we need only revise certain couplets. For each sex the new species passes to a couplet containing *datanae* and *sinuata*, and proper discrimination of the three will require careful appreciation of details, some of which

¹ Contribution from the Systematic Entomology Laboratory, U. S. Department of Agriculture, and from the Entomology Department, North Carolina Agricultural Experiment Station, published with the approval of the Director of Research as Paper No. 3078 of the Journal Series.

² Cost of immediate publication paid by senior author—Editor.

³ Mail addresses: c/o U. S. National Museum, Washington, D.C. 20560 and P. O. Box A, Columbia, Missouri 65201, respectively. Junior author formerly graduate assistant, Entomology Department, North Carolina Agricultural Experiment Station, Raleigh, North Carolina.

are comparative and subject to variation. If the denser groupings of hairs are misinterpreted as "defined patches," especially if the hairs have been wet and are matted together, males of *manducacae* will run in Reinhard's key to *W. imitator* Reinhard, a different species with gray parafrontals, vibrissae even with the mouth margin, and different male genitalia.

MALES

13. Parafacial rather thickly haired; mid tibia usually with one or more short bristles proximad of the long median *ad* bristle; inner forceps, in profile, with anterior margin straight or only weakly curved at apex
 *W. datanae* (Townsend)
- Parafacial sparsely and inconspicuously haired; mid tibia only with the long median *ad* bristle, rarely a weak bristly hair proximad of it 13a.
- 13a. Abdominal terga IV and V ventrally with moderately dense aggregations of long hairs, appearing as dark patches but not sharply bounded; vibrissae above anterior margin of mouth; front relatively narrow, half or less the width of an eye; tergum III (apparent II) without median marginal bristles *W. manducacae*, n. sp.
- Abdominal terga IV and V ventrally with regularly spaced hairs, not in patchlike aggregations; vibrissae even with anterior margin of mouth; front relatively broad, nearly $\frac{2}{3}$ the width of an eye; tergum III often with a pair of strong erect median marginal bristles ... *W. sinuata* Reinhard

FEMALES

14. Mid tibia with 1 long *ad* bristle and usually some (1-5, commonly 1-2) moderately strong bristles proximad of it; parafacial moderately haired; hind tibia moderately long and evenly ciliate, with one long median *ad* bristle; palpi decidedly thickened apically, more than twice as thick as on basal third; large species (9-13 mm.) *W. datanae* (Townsend)
- Mid tibia with 1 long *ad* bristle, at most, and only occasionally, a slightly developed bristly hair immediately proximad; parafacial generally with few and scattered hairs 14a.
- 14a. Palpi slender, slightly clavate; hind tibia ciliate but with well-separated bristles in the anterodorsal row, and 1 outstanding median *ad* bristle; antenna chiefly blackish; small species (6-8 mm.) ... *W. sinuata* Reinhard
- Palpi decidedly thickened apically, more than twice as thick as on basal third; hind tibia rather thickly and evenly short ciliate anterodorsally, with the usual median *ad* bristle; antenna chiefly reddish; larger species (8-10.5 mm.) *W. manducacae*, n. sp.

Winthemia manducacae Sabrosky and DeLoach, n. sp.

Parafrontals golden, in strong contrast to the silvery parafacials, which are sparsely and inconspicuously haired; venter of abdominal terga IV and V moderately densely beset with long hairs, but not with well-defined patches.

Parafrontals golden, sharply contrasting with the silvery parafacials and face; frontal stripe maroon to blackish; antennae chiefly reddish, more so in females than in males, third segments more or less blackish dorsally and distally, second

segments infuscated especially on outer surface and particularly in males; palpi yellow. Thorax densely gray tomentose, slightly yellowish gray on mesonotum, with five narrow black stripes, the median less distinct than the others; scutellum chiefly reddish gray, dusky towards base. Abdomen black in ground color toward base and on median third to half, reddish on sides and apex, more or less yellowish-gray tomentose, intermediate segments (III, IV) shining on distal fourth to third. Legs black, femora heavily gray tomentose, tibiae dusky yellow. Hairs and bristles black, except for white hairs on back of head.

Male. Width of front at vertex 0.200 (0.174–0.214/10) times the head width and half or a little less the width of an eye, widening slightly anteriorly; parafacial sparsely and inconspicuously haired, with at most two irregular rows of fine hairs, more commonly one row of a few scattered hairs, often appearing bare at low magnifications, and occasionally actually entirely bare (average, 6 hairs per parafacial, range 0–16, with 75% having from 2–8 hairs); vibrissae clearly above level of anterior margin of mouth; antenna smaller than in female, third segment equal to or barely wider than the width of a parafacial below.

Ventral aspect of abdominal terga IV and V without sharply defined hair patches, though centrally with hairs longer and denser than usual, and obviously different than the evenly distributed hairs of *datanae*, *sinuata*, and similar species; inner forceps in profile distally narrowed and strongly curved (as in fig. 6 of Reinhard, 1931).

Legs: Mid tibia anterodorsally usually with 1 long and strong median bristle (95 of 100 specimens; in 5 with slightly developed bristly hair proximad of it); hind tibia anterodorsally commonly (67 of 100) evenly and closely ciliate, sometimes (33) with a longer bristle midway on at least one tibia.

Length: 8.5–11.5 mm.

Female. Width of front at vertex 0.286 (0.278–0.299/10) times the head width, widening anteriorly; parafacial very sparsely haired, less so than in males of the species (and much less than in female *datanae*), with average 3.69 hairs per parafacial (range 0–10, with nearly 75% having from 1–5 hairs); antenna longer and larger than in male, third segment 1.6–2 times the width of a parafacial below. Mesonotum, scutellum, and abdomen more heavily tomentose than in male, and also more than in female *datanae*, the general appearance yellowish gray; strong MM bristles on abdominal tergum III (apparent II), and rarely (8 of 100) a pair or one of a pair (3) of weaker but evident MM bristles on tergum II. Legs: Mid tibia anterodorsally with 1 long and strong median bristle, and usually with normal hairs (77 of 100 specimens), occasionally (23) with a short but bristlelike hair proximad of the median bristle; hind tibia anterodorsally not as evenly and closely ciliate as in male, and with one strong outstanding bristle beyond middle of row of cilia.

Length: 8.0–10.5 mm.

Holotype male, allotype female, near Clayton, Johnston County, North Carolina, July 17 (♂) and 19, 1963, reared from *Manduca sexta* pupa no. 14 (C. J. DeLoach), each mounted with puparium. Type No. 70951 in the U. S. National Museum of Natural History. Paratypes, selected from a large number of both reared and field-collected examples: 112 males, 128 females, all North Carolina,

1961-63, from Columbus, Franklin, Granville, Guilford, Hertford, Johnston, Madison, Rockingham, Surry, Wake, and Wilkes Counties, and from near Rocky Mount, chiefly reared from pupae of *Manduca sexta* and mounted with puparia, also a few field-collected adults (caught in tobacco beds), also 6 males reared from pupae of *Manduca quinquemaculata* (Haworth).

Winthemia manducaae bears some resemblance to both *sinuata* and *datanae*. It particularly resembles the former in having sparsely haired parafacials and distally hooked inner forceps. However, *sinuata* is a small species with a relatively broad front and venter of abdomen evenly haired throughout in the males, and the vibrissae even with anterior mouth margin and palpi slender in both sexes. The antennae in *sinuata* are also much darker than in the other two species, and the yellow parafrontals and yellowish to gray parafacials do not contrast as strikingly as do the golden parafrontals and silvery parafacials in *manducaae*.

Winthemia datanae is a large species like *manducaae* and resembles it in having distally enlarged palpi in the females and in having the vibrissae well above the anterior mouth margin in the males, more than in *manducaae*. However, in *datanae* the parafacials are densely haired, the ventral portions of abdominal terga IV and V are fairly evenly haired, and the inner forceps are nearly straight on their anterior margins, or only weakly hooked, as seen in profile.

Winthemia datanae (Townsend)

Because of the close similarity of the new species, it was important to check the variation in several taxonomic characters of *datanae*. Ample material was available from material reared from *Datana* spp. in the Northeast (Mass., R.I., Conn., N.Y., and N.J.) by personnel of the old Gypsy Moth Laboratory. A series of 100 males and 100 females was examined.

Male. Mesonotum and abdomen bluish gray, the tomentum less dense than in *manducaae*; parafacial moderately densely and conspicuously haired, with the equivalent of three or four irregular rows that usually extend down to uppermost bristles on facial ridges; no MM bristles on abdominal terga II and III (apparent I and II); ventral aspect of abdomen evenly haired, the hairs longer on V but barely if any more densely set than on IV; mid tibia anterodorsally with one long and strong median bristle and usually one or more short bristles proximal of it (in 21 specimens of 100 the adjacent short bristle is weakly developed, only slightly longer and stronger than the more proximal hairs; in a few 2-3 short bristles were present, and in one 6 bristles), the largest short bristle little more than half the length and little over $\frac{2}{3}$ the diameter of the long *ad* bristle; hind tibia anterodorsally evenly and closely ciliate, without a longer bristle; in profile, inner forceps distally narrowed, the anterior margin almost straight, at apex not or only weakly curved.

Female. Mesonotum and abdomen more tomentose than in male *datanae*, but less than in the female of *manducae*, the general appearance bluish gray; parafacial more sparsely haired than in males, with two to three irregular rows extending down to or almost to uppermost facial bristles and more densely haired than in *manducae*; strong MM bristles on abdominal tergum III (apparent II), lacking in only one of 100 examples; mid tibia anterodorsally with one long and strong median bristle and one to five moderately strong bristles proximal of it (commonly 1 or 2; in one specimen there were 4 proximal and in another 3 proximal and 1 distal), the longest of these over $\frac{4}{5}$ the length and over $\frac{3}{4}$ the diameter of the main *ad* bristle; hind tibia anterodorsally not as closely and evenly ciliate as in the males, usually with one strong bristle standing out distal of the middle of the row and sometimes an intermediate-sized bristle at about $\frac{2}{3}$ the length of the tibia (longer bristles lacking in only 3 of the 100 examples).

HETEROGONY IN *CALLIRHYTIS SERRICORNIS* (KINSEY)

(HYMENOPTERA: CYNIPOIDEA)

ROBERT J. LYON, *Los Angeles City College,*
Los Angeles, California 90029

ABSTRACT—Experimental rearings and field observations have shown that the cynipid wasp, *Dryocosmus grumatus* Weld is actually the alternating, agamic generation of *Callirhytis serricornis* (Kinsey). Since *Callirhytis serricornis* was described in 1922, the name has priority over *Dryocosmus grumatus*, described in 1952. The biology of the species is discussed and the galls are illustrated.

The cynipid wasp *Callirhytis serricornis* (Kinsey) was first described as a bisexual generation that formed clusters of grain-like galls on the staminate flowers of the oak, *Quercus wislizenii* A. DC. (Kinsey, 1922:288-9). At this time, Kinsey suggested that such a bisexual generation probably had an alternate, agamic generation that produced galls on another part of the tree. Despite the fact that these galls are often very numerous on *Quercus wislizenii* and also on the coast live oak, *Quercus agrifolia* Née, no alternate, agamic generation has as yet been linked with this species.

In April of 1967, several large coast live oaks, growing in La Canada, California, showed heavy infestation with galls of this species. Nearly all the staminate flowers were covered with the typical galls and the insects emerged by the hundreds between April 12 and April 15. Numerous females were seen ovipositing into the veins on the under-surfaces of the leaves and these leaves were carefully marked with colored thread. Specimens, reared in the laboratory, were allowed to mate and were then released on young oaks growing in containers. A number of these specimens oviposited into the leaf veins as had